



PATIENT WARMING SYSTEM

MODEL PWS 2000

INSTRUCTION AND SERVICE MANUAL

Postal Address:	P.O. Box 879, Belmont, Victoria 3216, Australia	
Telephone:	National (03) 5229 0200	International: +613 5229 0200
Facsimile:	National (03) 5229 3551	International: +613 5229 3551
Prepared:	10 May, 2000	
Revised:	6 February, 2001	
Revision:	C	
Applies to:	Board Revision c	

Copyright © 2000 Jomesh Technologies Pty Ltd

CONTENTS

1.	<u>SPECIFICATIONS</u>	3
2.	<u>INTRODUCTION</u>	4
3.	<u>OPERATION</u>	4
4.	<u>WARNINGS</u>	5
5.	<u>SERVICE</u>	6
6.	<u>SCHEMATIC DIAGRAM DESCRIPTION</u>	7
6.1.	<u>Microcontroller</u>	7
6.2.	<u>Digital Temperature Sensor</u>	8
6.3.	<u>Reset Circuit</u>	8
6.4.	<u>System Block Diagram</u>	9
7.	<u>PREVENTATIVE MAINTENANCE</u>	9
7.1.	<u>Electrical Safety Inspection</u>	9
7.2.	<u>Performance Inspection</u>	10
7.3.	<u>Over-Temperature Cutout Testing</u>	11
7.4.	<u>Filter Replacement</u>	11
8.	<u>CONTROL BOARD COMPONENT LEGEND</u>	13
9.	<u>SCHEMATIC DIAGRAMS</u>	14
9.1.	<u>Control Board Schematic Diagram</u>	14
9.2.	<u>System Block Diagram</u>	15
10.	<u>PARTS LIST</u>	16
10.1.	<u>General Assembly</u>	16
10.2.	<u>Control Board</u>	17
11.	<u>CERTIFICATIONS AND COMPLIANCES</u>	18

1. SPECIFICATIONS

GENERAL	
Model Number	PWS 2000
Supply Voltage	240 Vac \pm 6%
Supply Frequency	50 Hz
Supply Power	1300 Watts Maximum
External Fuses	2 x 8 Amp DA205 5x20mm Delay Type
Type of protection against electric shock	Class 1
Degree of protection against electric shock	Type BF
Applied Part	Warming Blanket & Delivery Hose
Degree of protection against ingress of water	Not specified
Method of disinfection	Surface disinfection is possible using a cloth moistened with a mild disinfectant solution.
Degree of safety in the presence of flammable anaesthetic mixtures with air/oxygen/nitrous oxide	Not specified
Mode of operation	Continuous
Environmental conditions required for transport, storage and operation	10°C to 40°C, Less than 90% relative humidity, non-condensing
PERFORMANCE	
Temperature settings for delivered air	Ambient, 34°C, 37°C, 40°C, 43°C or 46°C
Temperature accuracy of delivered air, except for the ambient temperature setting	\pm 2°C with delivery hose cover Not specified without delivery hose cover
Environmental conditions required to achieve the specified temperature accuracy	20°C to 22°C, 30% to 70% relative humidity, non-condensing
Time required to attain the specified temperature accuracy of delivered air following a change in temperature setting	5 minutes
DIMENSIONS	
Width	360 millimetres
Depth	210 millimetres
Height	370 millimetres
WEIGHT	10 kilograms

It is a pre-requisite for all staff skilled in using convective patient warming devices to understand the operating procedures contained herein.

2. INTRODUCTION

When used with Jomesh patient warming blankets, the Jomesh PWS 2000 is intended for preventing and treating hypothermia.

The PWS 2000 is a mains-powered, microprocessor-controlled unit that delivers temperature-controlled air through a flexible hose to the blanket. The temperature of the air delivered to the blanket can be set to ambient, 34°C, 37°C, 40°C, 43°C or 46°C.

When a temperature of 46°C is selected, the setting automatically drops to 43°C after 10 minutes, and then to 40°C after a further 45 minutes.

When a temperature of 43°C is selected, the setting automatically drops to 40°C after 45 minutes.

The unit will not cool the air delivered to the blanket below the ambient temperature of the room.

Air is drawn into the back of the unit and passes through a dust filter and then through a bacteriological HEPA filter. The unit automatically monitors the resistance to air flow through these filters and provides an alarm when they need to be replaced, thus removing the need for routine but often premature replacement of expensive HEPA filters.

The unit includes a number of over-temperature devices and automatically shuts down with an alarm in an over-temperature condition, such as that which might occur if the air inlet becomes blocked.

3. OPERATION

The Jomesh 2000 may be placed on the floor, mounted on the foot of the bed using the bracket provided, or clamped to an IV pole using the IV pole clamp.

Connect the mains cable to a normal, properly earthed 10-amp mains socket-outlet. The green STAND BY indicator will illuminate when power is connected.

Ensure that air is not prevented from entering the inlet slots at the rear by blankets or other objects.

Connect the air delivery hose to the blanket by pushing the plastic fitting into the air inlet port.

Select the desired temperature. The selected temperature setting will be indicated by an amber light. Another temperature may be selected at any time.

The internal 10 minute timer that automatically decreases the temperature setting from 46°C to 43°C after 10 minutes can be reset by momentarily selecting another setting and then re-selecting 46°C.

THE 46°C SETTING IS NOT RECOMMENDED ON PATIENTS WITH IMPAIRED CIRCULATION.

The internal 45 minute timer that automatically decreases the temperature setting from 43°C to 40°C after 45 minutes can be reset by momentarily selecting another setting and then re-selecting 43°C.

Switch the unit off by pressing OFF. The green STAND BY indicator will illuminate when the unit is off.

The unit will automatically switch off in an alarm condition and the green STAND BY indicator will illuminate together with the red FILTER indicator or the red FAULT indicator.

- In the event of a FILTER alarm, check that air flow into the back of the unit is not being restricted by an object such as a blanket, as this will be automatically detected as a blocked filter. Remove any such restriction and select the desired temperature setting. If the problem persists, disconnect the PWS 2000 from the patient and from the electricity supply and have the filter(s) replaced by a trained technician.
- In the event of a FAULT alarm, disconnect the PWS 2000 from the patient and from the electricity supply and have the unit serviced by a trained technician.

4. WARNINGS

- Use only in accordance with these instructions.
- Monitor patient temperature during use with unconscious patients.
- Do not use on patients with impaired circulation.
- Do not apply warm air directly to an open wound.
- Consider discontinuing use during vascular surgery when an artery is clamped.
- Do not apply warm air directly to the patient from the hose.
- Discontinue use in alarm condition.
- Unit must only be opened or serviced by a trained technician.
- Ensure the unit is subjected to the electrical safety and performance inspections as specified in this manual.

5. SERVICE

This Manual presents all the relevant technical information for the Jomesh PWS 2000 Patient Warming System. This information is provided as a service to medical, nursing, paramedical, engineering and technical personnel. This information is intended for the fair purposes of maintenance and repair of the PWS 2000. It is provided as Commercial-In-Confidence material to the Jomesh Distributor or PWS 2000 Owner and shall not be made available to any other organisation or person without the specific written permission of Jomesh Technologies Pty. Ltd. Refer to the previous sections of this Manual for operator information.

This Manual presents the following:

- Descriptions of the schematic diagrams.
- Discussion of Electrical Safety inspection procedures.
- Descriptions of the necessary preventative maintenance.
- All printed circuit board component legend, schematic diagram, and parts list information.

While every attempt has been made to ensure this Manual is accurate and complete, no responsibility is taken for any errors or omissions. Jomesh has a policy of continuous product improvement and product specifications and component types are subject to change without notice.

If you, as a user of this manual, have any relevant comments or questions about the PWS 2000 or this Manual, your communication with Jomesh would be welcomed. Our contact details are located on the first page of this Manual.

The PWS 2000 has been designed to provide a sophisticated Patient Warming System product. The PWS 2000 utilises microcontroller technology to control all functions and provide a user-friendly operator interface. Airflow through the PWS 2000 is maintained at approximately 0.85 m³/min (30 ft³/m) by a mains-powered fan blower. Room air enters the unit through a two-stage filter system comprising a replaceable dust filter and a replaceable HEPA filter. The filtered air passes over a 1250 Watt heating element and exits the unit through the PVC delivery hose.

The PWS 2000 operator controls consist of seven front panel push-button membrane switches grouped into OFF (STAND BY) and ON (34°C / 37°C / 40°C / 43°C / 46°C) functions. The PWS 2000 operator indicators consist of nine front panel visual indicators grouped into OFF (STAND BY), ON (34°C / 37°C / 40°C / 43°C / 46°C) and ALARM (FILTER / FAULT) functions. A set temperature of 46°C automatically decreases to 43°C after 10 minutes. A set temperature of 43°C automatically decreases to 44°C after 45 minutes.

Air temperature is measured as it exits the unit by a digital temperature sensor and controlled by the microcontroller. The PWS 2000 includes two independent over-temperature cutout switches and a pressure switch that detects when the filter(s) need to be replaced.

6. SCHEMATIC DIAGRAM DESCRIPTION

This section describes the PWS 2000 schematic diagrams. Reference should be made to the Printed Circuit Board (PCB) Component Legend contained in Section 8 and the Schematic Diagrams contained in Section 9.

The following should assist with the interpretation of the Schematic Diagrams:

- The Schematic Diagrams are organised in a flat structure.
- Electrical connectivity is shown by continuous wires and net labels on partial wires within a schematic sheet or net labels on partial wires between schematic sheets.
- Net labels (signal names) are prefixed with a forward slash when they are asserted with a logic "0" (eg: /SIGNAL).

The PWS 2000 Board implements the following functions:

- Microcontroller.
- Digital temperature sensor.
- Reset circuit.
- Push-button and pressure switches.
- Fan and heater relays.
- LED displays and their drivers.
- Buzzer and its driver.
- Power supplies.
- Power supply decoupling capacitors.
- Connectors.

The more important of these functions are elaborated below.

6.1. Microcontroller

The Atmel AT89S8252 microcontroller (U1) integrates a number of functions:

- CPU
- Program ROM
- RAM
- Interrupt controller
- External interrupts
- Counter/Timers
- Watchdog timer
- Digital Input/Output ports

The microcontroller performs the following functions:

- Monitors the air temperature through the digital temperature sensor.
- Monitors the push-button and pressure switches.
- Controls the display and buzzer drivers.
- Controls the fan and heater relays.

The microcontroller ROM is factory programmed with the application software program. The software program contained in the microcontroller ROM is subject to copyright. In the event of a microcontroller fault, Jomesh must fit a replacement part.

6.2. Digital Temperature Sensor

The Dallas DS1820 direct-to-digital temperature sensor (U4) measures temperature through a technique that utilises low and high temperature coefficient oscillators. The sensor is controlled by and communicates with the microcontroller (U1) over a single "wire".

6.3. Reset Circuit

When the microcontroller is reset either by power-on or by the watchdog timer:

- Digital Input/Output ports 0 - 3 go high.
- Signal /FAN_RELAY goes low switching on the fan relay.
The fan blower is switched on.
- Signal /HEAT_RELAY goes high switching off the heater relay.
The heater is switched off.

Thus the reset process implements a safety strategy to prevent the fan blower being turned off with the heater being turned on.

Power-On Reset

Following power-on capacitor (C3) charges from zero to +5V (VCC) through resistor (R1) connected to ground. This causes the Reset input of the microcontroller to be momentarily asserted high.

Watchdog Reset

The microcontroller watchdog timer is incremented regularly by the microcontroller hardware. When a watchdog timer overflow occurs the microcontroller is reset.

To prevent such a system reset the microcontroller watchdog timer is reloaded before it overflows by the application software program. If the microcontroller suffers a hardware or software malfunction, the application software program will fail to load the microcontroller watchdog timer. This failure will produce a system reset on overflow thus preventing the microcontroller from running out of control. This prevents a potentially hazardous situation from occurring.

6.4. System Block Diagram

The System Block Diagram shows the general electrical connectivity between the various PWS 2000 electrical and electronic subassemblies:

- Mains fuses.
- Over-temperature cutout switches.
- Mains power filter.
- Heater.
- Fan blower.
- Control Board.
- Solid-state relay.

Before removing any of the connections between the electrical and electronic subassemblies, make a careful note so that these may be correctly reinstated. Incorrect connections could compromise patient safety and/or damage the PWS 2000.

The System Block Diagram is presented as an aid to understanding the PWS 2000 and does warrant extensive discussion.

7. PREVENTATIVE MAINTENANCE

7.1. Electrical Safety Inspection

It is recommended that a program of regular electrical safety inspections be instituted for the PWS 2000. Information on the type and frequency of testing may be obtained from locally published technical standards.

In Australia, the relevant technical standards are:

- AS3511 Technical management programs for medical devices.
This standard specifies procedures required to develop equipment management programs for medical devices. Some of these include procedures for acceptance, fault management and routine testing of medical devices. This standard specifies electrical safety, essential safety and performance testing.
- AS2500 Guide to the safe use of electricity in patient care.
This standard provides a comprehensive guide to the safe use of electrically operated equipment used in health care facilities. Measures are detailed to provide and maintain patient and operator safety, including details of the classes of equipment and electrical installations to be used for particular medical procedures.

A Hospital Biomedical Engineering Department or third party service organisation nominated by Jomesh or the Jomesh distributor would be capable of performing the necessary electrical safety inspections and providing suitable test documentation.

Programmed electrical safety inspections are essential to confirm continued operator and patient safety. Mandatory, statutory requirements for electrical safety inspections may also apply.

7.2. Performance Inspection

The PWS 2000 does not require adjustment or calibration. A performance inspection will adequately verify the PWS 2000 functions.

Items Required:

- PWS 2000 Instruction & Service Manual.
- Digital Thermometer.
- Light-weight plastic bag.

STEP	PROCEDURE
1	If you have not already done so, read the PWS 2000 Instruction and Service Manual.
2	Place the PWS 2000 on a firm, level surface. Do not connect the PVC delivery hose to a warming blanket. Connect the PWS 2000 to the 240V supply mains.
3	Familiarise yourself with the operation of the PWS 2000 by operating the PWS 2000 with reference to the PWS 2000 Instruction and Service Manual.
4	The temperature control system is verified as follows: <ul style="list-style-type: none">• Ensure the delivery hose cover is undamaged and that it covers the entire hose.• Ensure that the environmental conditions are 20°C to 22°C, 30% to 70% relative humidity, non-condensing.• Place the digital thermometer sensor in the centre of the PVC delivery hose outlet.• Check that the temperature of delivered air stabilises within five (5) minutes following a change in set temperature.• Check that the temperature of delivered air corresponds with the set temperature to within $\pm 2^{\circ}\text{C}$.• Note that some variation between the set temperature and temperature of delivered air is possible because of the heat loss that occurs in the PVC delivery hose. The magnitude of the heat loss will depend on the ambient temperature and the degree to which the hose is longitudinally compressed or extended.
5	The filter occlusion monitoring system is verified as follows: <ul style="list-style-type: none">• Select the Ambient temperature setting.• Progressively occlude the air inlet louvres on the rear of the PWS 2000 using a light-weight plastic bag until the "Filter" alarm occurs.• With new filters, it should be possible to occlude almost all of the air inlet louvres before the "Filter" alarm occurs.

7.3. Over-Temperature Cutout Testing

The PWS 2000 over-temperature cutout function does not require adjustment, calibration or performance inspection. This test is entirely optional and may be performed at the discretion of those responsible for the technical management of the PWS 2000.

Items Required:

- PWS 2000 Instruction & Service Manual.
- Digital Thermometer.
- Shorting link comprising two 4mm ring terminals joined by 10cm of 10Amp rated wire.

STEP	PROCEDURE
1	If you have not already done so, read the PWS 2000 Instruction and Service Manual.
2	<ul style="list-style-type: none"> • Place the PWS 2000 on a firm, level surface. • Do not connect the PVC delivery hose to a warming blanket. • Disconnect the PWS 2000 from the 240V supply mains.
3	<ul style="list-style-type: none"> • Locate the front panel with the warning label. • Remove the eight (8) Philips head screws located around the perimeter of the front panel. • Remove the front panel.
4	<ul style="list-style-type: none"> • Locate the solid-state relay which is mounted on the inside of the left panel. • Securely connect the shorting link across the solid-state relay output terminals.
5	Replace the front panel by reversing step 3 above. At this stage, fit screws sufficient only to hold the front panel in place.
6	Place the digital thermometer sensor in the centre of the PVC delivery hose outlet.
7	Important Connect the PWS 2000 to the 240V supply mains and <i>immediately</i> select the Ambient temperature setting. The fan must operate during this test otherwise components may be damaged by excessive heat.
8	Check that the PWS 2000 ceases operation when the temperature of delivered air attains $70 \pm 10^{\circ}\text{C}$.
9	<ul style="list-style-type: none"> • Disconnect the PWS 2000 from the 240V supply mains. • Repeat step 3 above. • Remove the shorting link from the solid-state relay output terminals. • Ensure that all internal wiring is correctly reinstated.
10	Replace the front panel by reversing step 3 above.
11	Confirm that the PWS 2000 functions correctly by undertaking a performance inspection as detailed in Section 7.2.

7.4. Filter Replacement

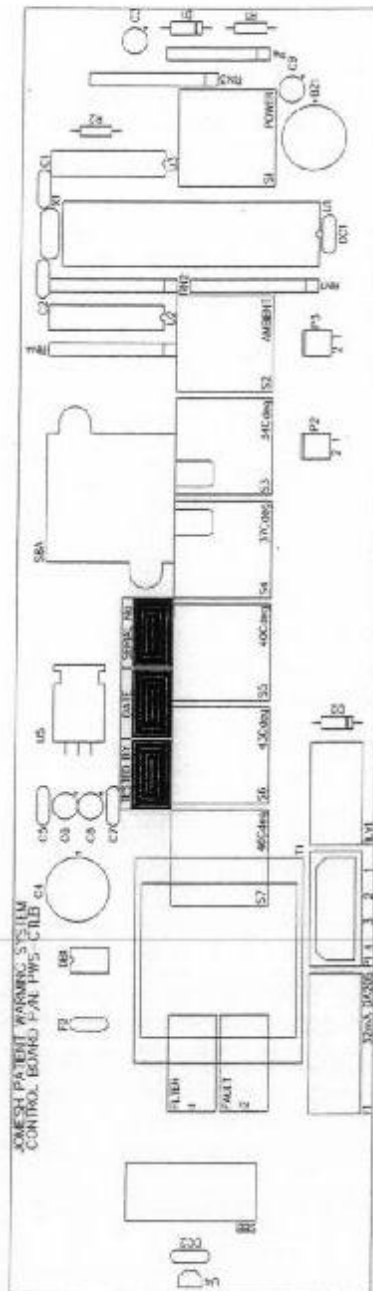
The PWS 2000 has a two-stage filter system comprising a replaceable dust filter and a replaceable HEPA filter. The dust filter or both the dust filter and HEPA filter may require replacement when a "Filter" alarm occurs.

Items Required:

- PWS 2000 Instruction & Service Manual.
- Philips Number 1 Screwdriver.
- Replaceable dust filter.
- Replaceable HEPA filter.

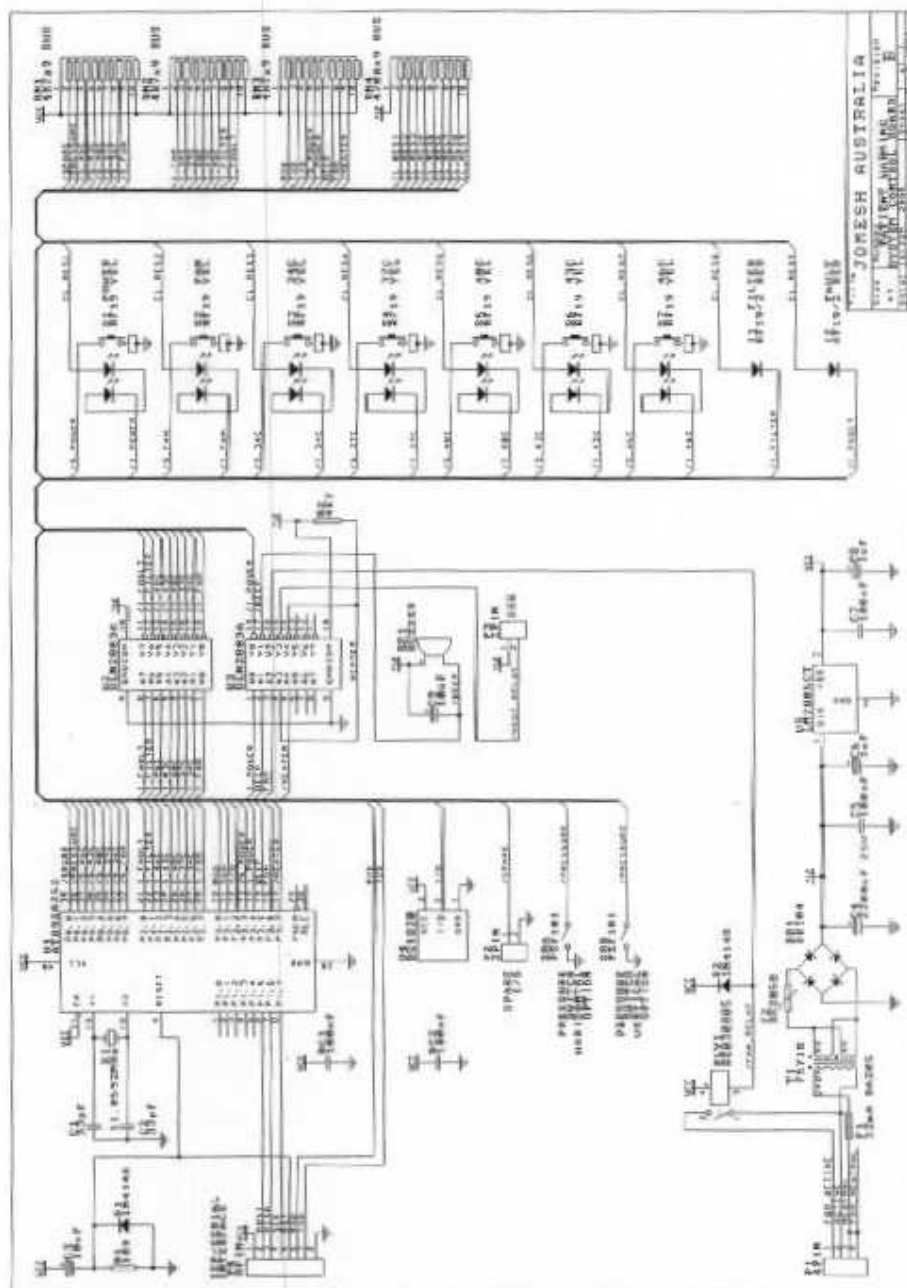
STEP	PROCEDURE
1	If you have not already done so, read the PWS 2000 Instruction and Service Manual.
2	<ul style="list-style-type: none"> • Place the PWS 2000 on a firm, level surface. • Do not connect the PVC delivery hose to a warming blanket. • Connect the PWS 2000 to the 240V supply mains.
3	Determine the occluded state of the filter(s) as follows: <ul style="list-style-type: none"> • Select the Ambient temperature setting. • Confirm that the "Filter" alarm occurs.
4	Disconnect the PWS 2000 from the 240V supply mains.
5	<ul style="list-style-type: none"> • Locate the rear panel with the air inlet louvres. • Remove the eight (8) Philips head screws located around the perimeter of the rear panel. • Remove the rear panel.
6	<ul style="list-style-type: none"> • Remove the dust filter and discard. • Replace the dust filter with a new item.
7	Replace the rear panel by reversing step 5 above. At this stage, fit screws sufficient only to hold the rear panel in place.
8	Again, determine the occluded state of the filter(s) as follows: <ul style="list-style-type: none"> • Select the Ambient temperature setting. • Confirm that the "Filter" alarm does or does not occur.
9	<ul style="list-style-type: none"> • If the "Filter" alarm occurs, then the HEPA filter must be replaced. Proceed to the next step. • If the "Filter" alarm does not occur, then the HEPA filter does not have to be replaced. Proceed to step 13. • If you wish to replace the HEPA filter anyway, proceed to the next step.
10	<ul style="list-style-type: none"> • Repeat step 5 above. • Remove the dust filter. • Remove the four (4) Philips head screws located near the corners of the frame securing the HEPA filter. • Remove the frame.
11	<ul style="list-style-type: none"> • Remove the HEPA filter and discard. • Replace the HEPA filter with a new item. Ensure the HEPA filter gasket is located on the air-off face of the filter.
12	Replace the frame securing the HEPA filter by reversing step 10 above.
13	Replace the rear panel by reversing step 5 above.
14	Confirm that the PWS 2000 functions correctly by undertaking a performance inspection as detailed in Section 7.2.

8. CONTROL BOARD COMPONENT LEGEND

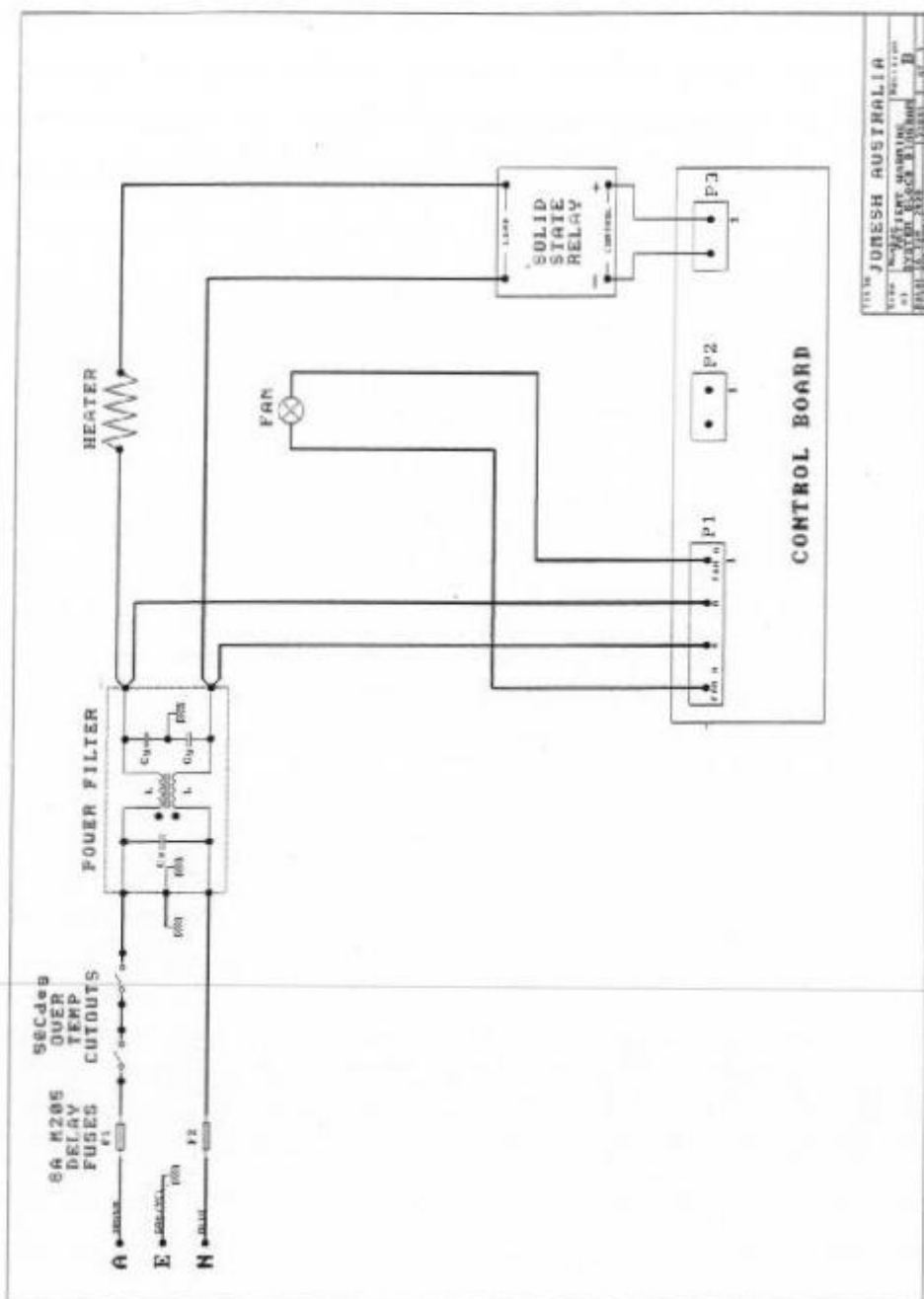


9. SCHEMATIC DIAGRAMS

9.1. Control Board Schematic Diagram



9.2. System Block Diagram



10. PARTS LIST

10.1. General Assembly

MANUF.	PART NUMBER	DESCRIPTION	QTY
Biomec	PWS-CTLB	Board, Control	1
Biomec	TBC	Cable Assembly, Ground, Chassis-Mains Filter	1
Biomec	TBC	Cable Assembly, Ground, Chassis-Solid State Relay	1
Biomec	TBC	Cable Assembly, Power, Fuse-Mains Filter	1
Biomec	TBC	Cable Assembly, Power, Fuse-Thermal Switch	1
Biomec	TBC	Cable Assembly, Power, Mains Filter-Control Board-Fan	1
Biomec	TBC	Cable Assembly, Power, Heater-Filter, SS Relay, Chassis	1
Biomec	TBC	Cable Assembly, Power, Mains Filter-Solid State Relay	1
Biomec	TBC	Cable Assembly, Power, Plug Cord-Fuse & Chassis	1
Biomec	TBC	Cable Assembly, Power, Thermal Switch-Mains Filter	1
Biomec	TBC	Cable Assembly, Power, Thermal Switch-Thermal Switch	1
Biomec	TBC	Cable Assembly, Signal, Control Board-Solid State Relay	1
TBC	TBC	Cable Gland, Black, 5-10mm Cable	1
Hilton Eng	TBC	Enclosure Assembly	1
TBC	TBC	IV Pole Clamp	1
Arfin	YC10T1	Filter, EMI, Mains, 250Vac, 10A	1
Flanders	0-007-2-19-03-SU-12-00-CC-2	Filter, HEPA, 12x12x2in, Gasket on Air-Off Face	1
TBC	TFM-390D	Filter, Pre-Filter, 30x30x2cm	1
TBC	TBC	Fitting, Hose, Blanket End, Black	1
TBC	TBC	Fitting, Hose, Blower End, Black	1
TBC	TBC	Foot, Rubber, Grey, Self-Adhesive	4
Bussman	210 8A	Fuse, 20x5mm, Delay	2
Schurter	FPG1 Series	Fuseholder, 5x20mm, Panel Mount, 4.8mm Tabs	2
TBC	TBC	Hose, Ribbed, White, 1.5mx60mm	1
LNI	2834-002	Label, Rating	1
LNI	2834-004	Label, Switch	1
LNI	2834-003	Label, Warning	1
Biomec		Labour, Assembly, Test & Pack	4
Crydom	D2425	Relay, Solid State, DC C8, Zero V Switch, 240Vac, 25A Load	1
TBC	TBC	Switch, Micro, NO	1
TBC	TBC	Switch, Thermal, NC, 50°C Opening Temperature	2

10.2. Control Board

CIRCUIT DESIGNATION	MANUF.	PART NUMBER	DESCRIPTION	QTY
(F1)	Multicomp	MCHTE15M	Fuseholder, 5x20mm, PCB Mount	1
(F1)	Multicomp	MCHTE150M	Fuseholder Cover 5x20mm	1
(S8)	TBC	3826F08.68	Terminal, Spade, Receptacle, PCB, 4.8mm (Pack of 100)	2
BZ1	Ster	TMB12	Buzzer, Miniature, 8-16Vdc	1
C1-2	Philips	33pF	Capacitor, Ceramic, 50V, 0.2" Pitch	2
C3,9	Rubycon	10uF 50V	Capacitor, Electrolytic, 25V, Radial 0.2" Pitch	2
C4	Multicomp	2200uF 25V	Capacitor, Electrolytic, 25V, Radial 0.2/0.3" Pitch	1
C5,7,DC1-2	AVX	100nF 50V	Capacitor, Ceramic, 50V, 0.2" Pitch	4
C6,8	Rubycon	1uF 25V	Capacitor, Electrolytic, 25V, Radial 0.2" Pitch	2
D1,2	Fairchild	1N4148	Diode, Small Signal, 75V 150mA	2
DB1	IR	1B04	Diode, Bridge, 400V 1A (4 Pin Plastic DIP)	1
F1	Littlefuse	SWE-218.032	Fuse, M205, Slow Acting Type T, 250V 32mA (Pack of 10)	1
F2	Raychem	RXE050	Fuse, Resettable Polyswitch, 60V 500mA	1
I1-2	Rafil	3.14001.061	Indicator, Fully Illuminated, Red, 1/8 RF19	2
P1	AMP	350211-1	Header, Round Pin, PCB Mount, 4 Way, 0.2" Pitch	1
P2,3	Molex	22-27-2021	Header, Square Pin, Friction Lock, PCB Mount, 2 Way, 0.1" Pitch	2
P4	AMP	3-103321-0	Header, Square Pin, PCB Mount, 8 Way, 0.1" Pitch (Strip of 40)	1
R1	Multicomp	10K	Resistor, 0.25W 1%	1
R2	Multicomp	4K7	Resistor, 0.25W 1%	1
RLY1	Schrack	RE030005	Relay, SPNO, 5Vdc Coil, 240Vac 6A Contacts	1
RN1-3	Bourns	4610X-102 472	Resistor Network, 9x4K7 Resistor with Common (10 Pin SIP)	3
RN4	Bourns	4610X-102 471	Resistor Network, 9x470R Resistor with Common (10 Pin SIP)	1
S1	Rafil	3.14001.022	Switch, Fully Illuminated, Green, RF19	1
S2-7	Rafil	3.14001.023	Switch, Fully Illuminated, Yellow, RF19	6
S8	World Mag	PSF101	Switch, Pressure, NO, 0.5 inH2O	1
T1	Arlec	75718	Transformer, Mains Step-Down, 240V:9V:9V TVA	1
U1	Atmel	AT89S8252-24PC	Microcontroller, 8-Bit, 8K Flash, 24MHz (40 Pin Plastic DIP)	1
U2-3	Any	ULN2803A	Driver, Darlington, 8-Channel (18 Pin Plastic DIP)	2
U4	Dallas	DS1820	Thermometer, Digital, 0.5°C Precision (PR-35)	1
U5	National	LM7805CT	Voltage Regulator, Linear, Positive, +5V (TO-220)	1
X1	IQD	L108A	Crystal, 11.0592MHz, (HC49 (HC18/U) Can)	1
	IMP	PWS-CTLB	Printed Circuit Board, Double Sided, PTH	1

Certificate of Compliance

EMC Technologies Report No: M000546

Issue Date: 4th July, 2000

Test Sample: Patient Warming System
Model Number: Jomesh PWS 2000
Serial Number: 2078

Manufacturer: Biomedical Engineering Company of Australia Pty Ltd

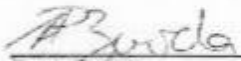
Tested For: Biomedical Engineering Company of Australia Pty Ltd
Address: P.O. Box 856,
Eltham, Vic 3095 Australia
Phone: +613 9458 1963
Fax: +613 9455 2088
Contact: Peter Ampt

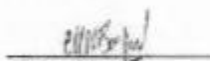
Test Standard/s: IEC 601-1-2: 1993 / AS/NZS 3200.1.2: 1995
Medical electrical equipment Part 1: General requirements for safety 2. *Collateral Standard: Electromagnetic compatibility - Requirements and tests*
EN55011: 1998 / AS/NZS2064: 1997 Emission
IEC 801-2: 1991 Immunity to Electrostatic Discharges
IEC 801-3: 1992 (Draft) Immunity to Radiated Fields
IEC 801-4: 1988 Immunity to Electrical fast Transients
IEC 801-5: (Draft) Immunity to High Voltage Surges

Result of Test: The test sample complied with the above standards.
Refer to Report M000546 for full details

Test Dates: 23rd May to 2nd June 2000

Test Officers:


Petra Zuvela


Chieu Huynh

Authorised Signature:


Stephen Phillips
EMC Technologies Pty Ltd

Issued by EMC Technologies Pty. Ltd., 57 Assembly Dve., Tullamarine, Vic., 3043, Australia.
Phone: +61 3 9335 3333 Fax: +61 3 9338 9260 www.emctech.com.au



This Laboratory is accredited by the National Association of Testing Authorities, Australia. The tests reported herein have been performed in accordance with its terms of accreditation.